We Don't Hear You:

Assessing Phonocentrism in Emergency Public Information to Engage the Deaf and Hard of Hearing Community

by Derrec Becker

Chief of Public Information & External Affairs

South Carolina Emergency Management Division

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Table of Contents

Abstract

Research into emergency messaging and delivery method efficacy in the Deaf Community was conducted to examine the most effective means for reaching this community, which is often underserved during disaster situations. Public safety agency reliance on audio and/or broadcast messages often require a Deaf or Hard-of-Hearing individual to seek information from somewhere other than the official source. Survey results as part of this research indicated members of the Deaf Community prefer to receive emergency information via text messages on mobile devices as well as through official, verified social media channels used by public safety agencies. While the multiple selection questions of the survey indicated a preference for text messages, several open-ended responses highlighted the desire of Deaf individuals to be provided an American Sign Language Interpreter during emergencies. Research results indicated the need of public safety agencies to engage the Deaf Community directly regarding emergency public alert planning. Such planning efforts can aid agencies when crafting emergency messages. By adhering to a message structure preferred by the Deaf Community, the emergency alerting authority will be able to issue an emergency message that will be easily understood by a greater whole of the community. While further research on a broader scale is indicated by this initial work into emergency messaging efficacy, agencies can use these findings as a primer to engage the Deaf Community and improve emergency messaging with little effort to effect existing resources.

Introduction

Existing assessments on the efficacy of public warning and emergency communications systems in the United States on reaching Deaf and hard-of-hearing citizens (Deaf/HH) after major events during the previous decade demonstrate that this population has been both historically underserved and faces unique risks during emergencies (Stout et al 2004, Engelman 2012, Ivey et al. 2014, White 2014). While peer-reviewed emergency management research on this topic is sparse but growing, existing health literacy research conducted during the 1990s and early 2000s reveals a lack of awareness amongst the Deaf, DeafBlind, hard-of-hearing, and Late Deafened (referred to collectively as Deaf/HH for the remainder of this article) is affected by intertwining communication and cultural competency issues on the part of individuals preparing informational literature for the general population and in training emergency service providers.

A central issue revealed by previous research is that many of the Deaf/HH community view themselves as a distinct linguistic minority, and as such, are not always fluent enough to communicate through written English or understand printed material prepared at the reading level of the average native English speaker in the United States. This linguistic cultural difference results in reported communication difficulties between first responders and Deaf/HH individuals during emergencies with research showing that these difficulties are compounded further during large-scale emergencies where individuals are evacuated into shelters. In recent large-scale disasters there were reported incidences of Deaf/HH individuals missing vital information, such as the availability of food and other aid, due to the lack of American Sign Language interpreters in the shelters. This failure on the part of emergency personnel in not providing sufficient non-verbal communication methods represents the underlying phonocentrism in current emergency management planning.

Census estimates show that the proportion of Americans with a hearing disability (a broad category that encompasses the Deaf/HH community and individuals who have experienced hearing loss)

was 3.5% in 2016, a figure that has not change much over the past two decades but does vary by state (Census 2016, Census 1997). For example, the proportion of South Carolinians with hearing difficulty increased between 2010 and 2016 from 3.6% to 3.9% (Census 2010, 2016). Compared with the national rate, this indicates that the proportion of individuals with hearing difficulty in South Carolina was slightly higher than the national average over the same period of time (Kraus 2017). Like other physical disabilities, hearing loss among those who are post-lingually deaf is correlated with age; the Census figures show that 13.4% of the national population 65 and older had a hearing disability in 1997, which increased to 14.8% in 2016 (Census 1997, Census 2016). The correlation of hearing loss with age compounds the risk faced by these individuals during a large-scale emergency, such as a hurricane. Furthermore, demographic projections for the United States show that the proportion of citizens aged 65 and older with hearing disabilities is expected to increase in the coming decades. This supports the need for development targeted emergency preparedness material and first responder training on assisting Deaf/HH individuals.

Literature Review

The peer-reviewed literature on emergency preparedness for the Deaf/HH community is sparse and some of the most cited research comes from gray-literature and formal agency reports. A review of the existing literature reveals several key themes related to the problems experienced by Deaf/HH individuals during previous emergencies and recommended solutions. At the same time, the rapid development of technology within the past decade, specifically the proliferation of smartphones and tablet devices with large, interactive screens, has rendered some of the early solutions moot while providing the opportunity for more efficient delivery of visual communications both for emergency preparedness material and during emergencies.

The root cause of the lack of coverage on Deaf/HH issues in emergency preparedness material is identified in the research as arising from language and cultural barriers. Such inherent differences make

it difficult for Deaf/HH individuals to access emergency preparation material and hamper officials' ability to communicate with Deaf/HH individuals and officials during an emergency. These language and cultural barriers stem from the fact that some Deaf/HH individuals view themselves as members of a linguistic minority rather than disabled. Miscommunication becomes compounded by a lack of cultural awareness on the part of emergency officials in addressing the Deaf/HH as a distinct community. Better preparing planning material and training emergency for responders on the unique communication issues faced by Deaf/HH individuals is needed. For example, a Deaf/HH individual may communicate primarily through American Sign Language (ASL), Signed Exact English (SEE), Pidgin Signed English (PSE), Cued Speech, speechreading (previously known as lip-reading) or spoken English. A Deaf/HH individual whose native language is a form of sign language may be unable to effectively communicate through written English or speechreading, leaving an emergency responder, who might assume a Deaf/HH individual can communicate through these means, unprepared to relay important information.

There are several key aspects of the Deaf/HH culture that are important to consider. The most important is that members of the Deaf community do not consider themselves disabled (Siple et al. 2004, Benedict and Legg n.d.). Deaf/HH individuals construct their cultural identity around seeing and communicating through the use of sign languages and do not consider of their inability to hear as a loss or impairment. The pathologizing of deafness and emphasis on treatments or integration of Deaf individuals into hearing culture have led to continual tension between the Deaf/HH community and hearing community. Developing a productive relationship with the Deaf/HH community requires individuals within an organization to overcome this historical legacy by recognizing Deaf culture as distinct from hearing culture and avoiding treating the Deaf/HH community as disabled members of the hearing community.

Another cultural aspect that is frequently misunderstood is sign language. Most Deaf/HH individuals are born to hearing parents which means that unlike most other cultures in which children

learn through interactions with their parents, Deaf culture is learned through deliberate interactions with members of the Deaf/HH community (Siple et al. 2004, Benedict and Legg n.d.). The use of sign languages is the dominant method Deaf/HH individuals use to build cultural solidarity and there are multiple sign languages in the world. Deaf/HH individuals in the United States use American Sign Language (ASL) but ASL is not a signed form of English; it is a unique language with distinct grammatical structure and words. This is important to consider when developing informational material for the Deaf/HH community because using videos or other non-written communication media may be more effective to communicate a complex message. At the same time, some English words do not have a signed equivalent making it vital to work with members of Deaf/HH when translating existing material into an ASL message.

Two final aspects of Deaf/HH culture are important for emergency managers to consider when developing preparedness material and personnel training. Deaf culture is detail oriented, meaning that Deaf/HH individuals want thorough explanations and instructions. This cultural factor has resulted in a strong desire for detailed information and interpersonal communication within the Deaf community. The Deaf community is also collectivist, in contrast to the individualistic values in dominant American culture. The collectivist value means that Deaf/HH individuals on average have stronger immediate social networks, which is beneficial because it allows information to spread faster. This collectivist value should not be interpreted as a lack of self-sufficiency but could lead to tensions during an emergency if first responders expect individuals to prioritize their personal safety over the safety of the community.

The Deaf and Hard of Hearing Consumer Advocacy Network's (DHHCAN) 2004 analysis of emergency communication during 9/11 is one of the earliest post-emergency evaluations focused on the experiences of the Deaf/HH community. The authors' detail communication problems with Deaf/HH individuals that occurred at every level during the crisis. These problems included higher than normal caption error rates and inconsistencies on televised broadcasts. Some stations provided no closed

captioning due to an incorrect interpretation of federal regulations as only applying to weather related emergencies. The authors also noted the inability to access wireless communication networks in certain areas preventing communication through text messaging systems. Deaf/HH employees at the Twin Towers and Pentagon experiencing increased confusion and anxiety because they could not understand the verbal directions given by emergency personnel. The report makes multiple recommendations for improving the emergency communication network so that it is accessible to Deaf/HH individuals during any crisis, but the authors' general conclusion was that the existing public warning and communication system in the United States deserved a failing grade for its communication with Deaf/HH individuals.

Research that has followed the DHHCAN report has continued to show communication problems in both emergency preparedness material and during emergency situations. Barbara White's (2006) personal account of assisting Deaf/HH individuals in the aftermath of Hurricane Katrina provides a first-hand analysis of the gaps in the emergency response system during a large-scale disaster. Engelman et al.'s (2013) review of emergency preparedness workshops focused on the Deaf/HH community revealed these workshops have a positive impact but are not widespread. Neuhauser et al. (2013) argued that current all-hazard emergency preparedness and response material cannot effectively reach the Deaf/HH community because of the materials high readability level. Ivey et al.'s (2014) assessment of State Emergency Operations Plans revealed very few policies covering the specific functional and access needs of Deaf/HH individuals. Finally, Engelman and Deardorff (2016) evaluated cultural competency training for law enforcement officers and found that existing training provides officers with knowledge on Deaf/HH communication needs but does not necessarily lead to improved capabilities.

Barbara White (2006) made it clear that the failure of state and federal officials to understand the unique communication needs of the Deaf/HH resulted in this group experiencing an increased risk and adverse outcomes from the disaster. A key issue White identified was that a lack of communication

at large shelters resulted in Deaf/HH individuals, separated from hearing family members or caregivers, missing important announcements. Information about receiving assistance was not adequately communicated to the Deaf/HH which lead to them being passed over for aid during the first week because they did not know where or how to ask for help. A specific instance White mentioned was how it took a Deaf man three weeks to communicate with shelter staff and be reunited with his family. Another issue White highlighted was how policies at shelters prohibiting targeted donations worked against Deaf/HH evacuees in receiving the unique assistance they needed.

Engelman et al.'s (2013) review of emergency preparedness workshops targeted to the Deaf/HH community and a survey of key informants (KIs) revealed a clear need to develop best practices training for communicating with the Deaf/HH community. The survey of state-level Key Informants revealed positive correlations ($p = 0.02$ or lower) between a KI's understanding of the unique communication issues for Deaf/HH individuals with whether they received training on serving Deaf/HH individuals and between a KI's familiarity with relay phone call systems and with having received training. Unfortunately, the survey also revealed that most KIs (67.3%) had to attend these trainings outside of their departments because they were not provided in-house. The interviews of local KIs in community-based organizations serving the Deaf/HH revealed a similar lack of exposure to emergency preparedness training. Only one organization surveyed (7.1%) offered their own emergency training and preparedness class. Six organizations (42.9%) either collaborated with other organizations to provide training or provided access to training and classes by other organizations. This means that half of the surveyed organizations provided no training, classes, or material on emergency preparedness to their clients. The authors argue these data demonstrate that training should not be limited to public agency personnel but needs to include local emergency responders, community organizations serving the Deaf/HH, and members of the Deaf/HH community.

Following research in the field of health literacy, Neuhauser et al. (2013) assed the readability of emergency preparedness material to compare with the average reading level of Deaf/HH individuals. The authors argued this type of analysis is particularly important for emergency material because research shows the heightened emotional experience of a crisis reduces cognitive abilities. Reading comprehension becomes more difficult and vulnerable populations in general have lower levels of emergency preparedness. These factors, combined with notable lower English literacy rates for Deaf/HH individuals in the U.S., indicate emergency preparedness material for the Deaf/HH community should be prepared at the 4th grade readability level. The results of the study showed all of the reviewable material prepared for the Deaf/HH community was above the recommended 4th grade level, with half of the material testing above the 10th grade level. To make sure the content is understandable, the authors recommended a participatory design process be applied to review and develop future emergency preparedness material.

Ivey et al. (2014) conducted a review of state emergency operations plans (EOPs) to determine if they had incorporated any changes suggested by the DHHCAN report for improving access to emergency communication for Deaf/HH individuals and serving this population during an emergency. They found that only 31% of the EOPs explicitly mentioned the Deaf/HH population, while 55% mentioned special at-risk or vulnerable populations. The follow up survey with KIs revealed slightly better results. 52% of the KIs stated their departments had training sessions on how to serve the Deaf/HH population during an emergency and 67.3% of KIs stated they had participated in external training sessions on how to serve the Deaf/HH population during an emergency. The authors conclude that while these findings show an improvement in emergency planning for the Deaf/HH, gaps still exist in the understanding of the unique communication needs of the Deaf/HH community and in preparations to ensure communication access during an emergency.

Engelman and Deardorff (2016) evaluated cultural competency training for law enforcement officers handling domestic violence calls to examine if exposure to a Deaf trainer and information about the Deaf/HH community would improve the capability of emergency responders to serve this population. Engelman and Deardorff's article was unique in that it used a pre/post-survey design to capture the effect of training on participants' attitudes and knowledge of the Deaf/HH community. This method revealed important contradictions in the attitudes of law enforcement officers that need to be considered when implementing a training program focused on addressing the needs of the Deaf/HH community. The central finding indicated is that training improved the knowledge the officers had of Deaf/HH individuals. Most importantly, the training dispelled myths such as most Deaf individuals can speechread. At the same time, this increased knowledge did not lead to improved confidence at being able to assist Deaf/HH individuals during a large-scale emergency. This study also highlighted a conflicting attitude amongst some first responders, which the authors attribute to the American ideology of individualism, that these officers expected individuals to assume a certain level of personal responsibility in a disaster situation. The authors summarize this finding with a statement from the second focus group: "The loudest voice asserted that in an emergency of that size, it is not first responders' responsibility; it is incumbent on Deaf/HH people to be prepared" (Engelman and Deardorff 2016, 183).

A central conclusion in much of the existing literature on the experiences of Deaf/HH during an emergency and access to emergency preparedness material is that Deaf/HH individuals need to be incorporated in the development of emergency preparedness material at the local level. This level of involvement is advocated because these individuals will have direct knowledge of the local Deaf/HH community network and understand the best communication methods to reach this population. As Alina Engelman (2012, 2) stated on the importance of gathering feedback from this population when developing emergency communications, "The small ways in which responses are not tailored to the Deaf

community can have major repercussions or consequences." Incorporating Deaf/HH individuals in the development process also allows officials to create preparedness and training material tailored to the most probable disasters within a geographic area. As Sullivan and Häkkinen (2006) and White (2006) noted, mass evacuations pose distinct communication problems that require specific preparedness training to address.

Cripps el al. (2016) proposed an ambitious whole community approach to address this communication problem. Their Emergency Preparedness with People Who Sign (EPPS) is a two-tiered model that recommends focusing on teaching first responders basic American Sign Language phrases to assist Deaf/HH individuals during an emergency. They argue rather than relying on pictorial charts and phrase cards due to a lack of interactivity, first responders should learn basic, introductory ASL phrases that would be applicable to a given emergency. The first step in the EPPS model is to educate first responders on Deaf culture and ASL. The second step is to educate members of the Deaf community on emergency preparedness and the role of first responders during a disaster. Finally, the authors connect both groups together directly by advocating that members of the Deaf community become involved in the continual ASL training of first responders. The authors summarized the benefits of this whole community approach as follows:

> *As a result of the two-tiered awareness training for both professionals and community members, deaf individuals become actively empowered to participate in developing culturally and linguistically sensitive public safety services. Consequently, the training promotes the proliferation of signed language by introducing the use of ASL to reduce communication barriers and exemplifies the use of the universal design concept, where everyone can communicate via signed language regardless of hearing abilities. (Cripps et al. 2016)*

While the EPPS model is a promising solution to address the communication problem during emergencies, it is resource intensive requiring continual effort to maintain ASL skills amongst first

responders and investment from the Deaf/HH community. McKee et al.'s (2012) detailed analysis of conducting health research with the Deaf American Sign Language community indicates the level of involvement and potential problems for implementing Scripps et al.'s EPPS model in emergency management. Another issue with the EPPS model is that it does not address the problem of emergency preparedness education other than through advocating for training directly with members of the Deaf/HH community. Emerging technology provides a less resource-intensive direction to potentially address this communication problem.

Maiorana-Basas and Pagliaro's (2014) recent study on technology use among the Deaf/HH is important because their survey updates previous work and indicates how to utilize technology to best target emergency preparedness material to Deaf/HH individuals. In line with prior work, the authors found that Deaf/HH individuals of all ages were eager adopters of new technology, frequently using smartphones (71.6%) and personal computers (70.9%). Another important finding was the decline in use of TTY/TTD (Teletypewriter/ Telecommunications Device) with 70.1% of respondents reporting they rarely if ever used these devices. The authors looked at Web site usage specifically and found that a large portion (41.4%) of respondents wanted captions or caption options on Websites. Individuals who either used signed communication methods, had less education, or were older, reported that they preferred Web sites that incorporated a signing component. These findings indicate the emergency preparedness material targeted to the Deaf/HH community should include both caption and signing options and that emergency notification systems should focus on utilizing new technology and phase out dated TTY/TTD procedures.

Morris et al. (2014) survey of social media usage during emergencies by people with disabilities indicates that different technology approaches are necessary to reach Deaf/HH individuals during an emergency. The authors found that while social media usage among people with disabilities was high, social media usage during emergencies to receive, verify, and share information was low. While both

findings are similar to results from surveys of social media usage among the general population, the authors found that Deaf individuals' usage of social media during an emergency to receive and share information was significantly different from hard-of-hearing individuals. Overall, the data indicated that social media usage may not be an effective communication strategy, with usage ranging from a high of 27% to low of 10% between groups but social media may be a useful communication method for delivering life-safety information to Deaf individuals if it is made accessible.

It is clear from the existing literature that the majority of current emergency preparedness material and training is ill suited to address the unique communications needs of Deaf/HH citizens. Drawing from the previous literature evaluating emergency preparedness communication and technology usage among Deaf/HH individuals, it is recommended to start addressing this miscommunication issue by incorporating Deaf/HH individuals in the development of emergency preparedness materials using new media technology targeted to the Deaf/HH community. For this project, a short survey was conducted of individuals within the Deaf/HH community as a starting point to assessing the current level of knowledge on emergency preparedness, provide feedback on specific communication technologies, and assess the types of emergency message content that could more effectively reach this population.

Methods

A needs assessment to determine the current knowledge of the Deaf/HH community in relation to individual emergency preparedness and communication methods for receiving emergency information was conducted. The literature review along with the personal experiences of the S.C. Emergency Management Division (SCEMD) Chief of Public Information demonstrate communication gaps exist between emergency management professionals and the Deaf/HH community. A needs assessment is an appropriate first step to estimate these current deficiencies and determine the priority for future program development to address the unmet service needs (Royse et al. 2010). The survey

(Appendix B) was designed to gather data on several key areas of concern: the cohesiveness of the Deaf/HH community, the current level of emergency preparedness of Deaf/HH citizens, and the preferred communication methods of Deaf/HH individuals. The survey questions and structure were reviewed by an ad-hoc committee of stakeholders established solely for the purposes of this project. Committee members included Jason Hurdich, Certified Deaf Interpreter; Shonna Magee Hudson, Nationally Certified Interpreter; Dr. Christopher Robinson, Research Sociologist with the University of South Carolina; and Aaron Shoemaker, Director of All Hands On, Inc.

The primary sampling method included directly emailing the survey link to Deaf/HH community leaders. The email (Appendix A) encouraged these community leaders to share the link with other people they thought would be interested in completing the survey, creating a "snowball sampling process" that resulted in 100 completed surveys. Snowball sampling is an appropriate data collection method for research targeting individuals within vulnerable or marginalized populations with high rates of connectedness between members. While these methods make generalization of the findings problematic because they are not random sampling techniques, this study was designed as a starting point to develop participant-designed emergency preparedness material and responder training targeted to the Deaf/HH community at the local level.

The survey was conducted in written English only due to the financial and time constraints required to translate the survey into ASL. This means the data collected will not be fully representational of the Deaf/HH community because individuals who have English as a non-fluent, emerging language would not be able to submit responses. While it is possible that a respondent could have had the survey translated for them by another individual, suggesting that respondents do that would appear culturally insensitive therefore, there is nowhere on the survey for a respondent to indicate this is how they completed the survey.

One of the main trade-offs in the data collection process was using a short survey to encourage participation. Shortening the survey meant eliminating typical demographic questions, such as educational attainment, age, and household income. While this reduces the possible findings, the structure of the data being primarily nominal and open-ended responses already limited the potential analysis to basic bivariate techniques. The data was collected through an online survey tool and analyzed using Excel and R. The free response answers were analyzed using an interpretive content analysis coding process (Weber 1990).

Results

The survey data for this paper was collected between August 15th and 23rd (the survey is still active allowing for future analysis with additional data) and generated 100 responses. Respondents live in 19 states with the largest groups from South Carolina (51), Pennsylvania (17), and Florida (11). Figure 1 shows the breakdown of the sample based on hearing identity. The majority of respondents (60%) identify as Deaf and the second largest category is hearing individuals with connections to the Deaf community (28%). These two items were collapsed into two binary variables (Location: South Carolina or other, Identity: Deaf/HH or hearing) allowing for Chi-square tests of significance between groups. It was important to test for difference by location because the sample was heavily unbalanced, since 51% of respondents were from one state, and testing for difference by identity was done to explore how cohesive the Deaf/HH community is. If the findings show significant difference at either group level, then the sample cannot be viewed as homogenous.

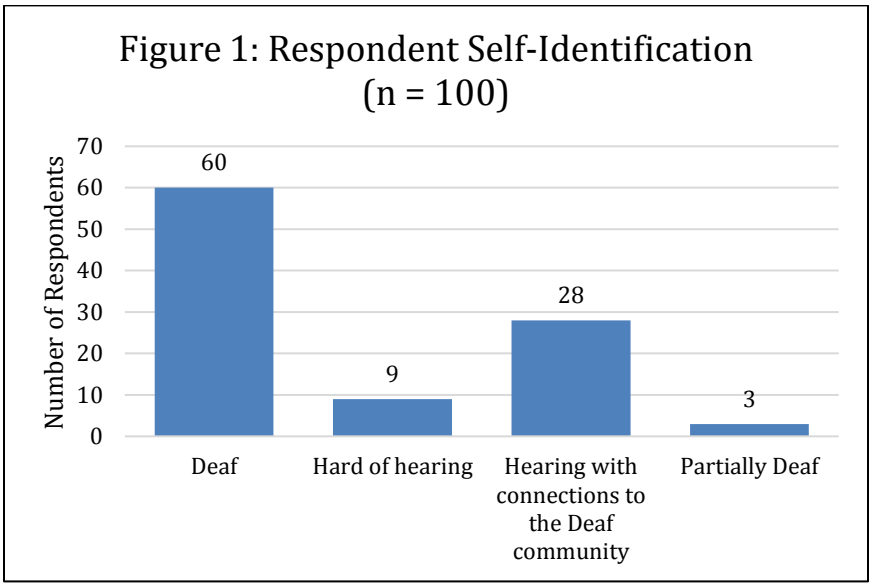

Table 1 shows the data on the current level of emergency preparedness for the sample. The majority of the sample (60%) indicated they have a personal emergency plan and 20% indicated they wanted help developing a plan. Only 16 respondents indicated they intend to rely on government services during an emergency. Combining these individuals with those who have a plan but stated they would need help during and emergency shows almost half of the sample (46%) anticipate needing assistance of some kind during an emergency. This analysis suggests that providing training to first responders on working with the Deaf/HH is an area of need.

Table 1

Which of the following best describes how you are personally prepared for emergencies such as a house fire, a tornado, a hurricane and/or an earthquake?	
I have a personal emergency plan and know exactly what I should do during an emergency.	30
I have a personal emergency plan, but I will need help from others during an emergency.	30
I do not have a personal emergency plan and I would like help in creating one.	20
My personal emergency plan will rely on government services if and when they are available.	16
I do not need a personal emergency plan.	4

Table 2 displays the data on the attitudes towards local safety agencies. Only 18 respondents stated their local public safety agency was very involved with the Deaf community, 36 respondents stated their local public safety agency was not at all involved with the Deaf community, and 38

respondents stated their local safety agency was somewhat involved. This data clearly suggest that local safety agencies need to improve their connections and involvement with the Deaf community. Some of the responses given under the other option underscore this need. One respondent wrote “Individual first responders have some sensitivity to Deaf concerns but as a whole, clueless about Deaf needs.” Another respondent wrote “I know nothing of them...they do not conduct any community outreach” While a third respondent provided a more nuanced answer that indicates some agencies do a better job communicating to the Deaf community than others “Other cities in our state do not provide interpreting services when there is a state of emergency. The EMD in West Columbia is the only one that abides by this. Our Governor, present or past, does not provide interpreting services everytime[sic] when he or she is on TV providing information to the public.” This data indicates a clear need on the part of emergency management agencies to become more involved with the Deaf community.

Table 2

Which of the following best describes your local public safety agencies?	
Very involved with the Deaf community.	18
Somewhat involved in the Deaf community.	38
Not at all involved with the Deaf community.	36
Other (please specify)	8

Chi-square analysis indicates there is no significant difference between respondents who live in South Carolina and those who live in other parts of the country ($\chi^2 = 7.26$, $p = 0.064$). This suggest that emergency management departments across the country have similar levels of involvement with their local Deaf/HH communities have a need for improving those connections. The chi-square test for identity groups was also not significant ($\chi^2 = 5.02$, $p = 0.170$) suggesting that the evaluation of involvement does not vary based on whether a person is Deaf/HH or a hearing individual affiliated with the community. However, both of these results should be interpreted cautiously because each analysis included an expected frequency below five.

The data on how well local public safety agencies communicate during an emergency in Table 3 shows a similar trend. Only 21 respondents indicated their local public safety agency communicated either very well or extremely well, 43 respondents stated their local public safety agency communicated somewhat well, and 36 respondents stated their local public safety agency communicated poorly. This data indicates that improving communicating with the Deaf community during an emergency is a primary need for future emergency preparedness planning to address. The chi-square test again showed that these trends did not vary by the location group ($\chi^2 = 2.36$, $p = 0.307$), or the identity group ($\chi^2 = 3.80$, $p = 0.150$).

Table 3

How well do local public safety agencies communicate during an emergency?	
Extremely well	7
Very well	14
Somewhat well	43
Not so well	30
Not at all well	6

Attitudes about communication and organization within the local Deaf/HH community were combined into three categories: poor communication/other, infrequent communication, or frequent communication. Figure 2 shows that 27 respondents indicated either a disorganized, lacking, or other problem with the Deaf community in their area, 37 respondents indicated that communication was infrequent between members of the Deaf community, and 36 respondents indicated frequent communication between members of the Deaf community. These results suggest that a majority of Deaf/HH individuals state they are connected to an internal communication network. However, only 23 respondents indicated that the Deaf community was very organized while 50 respondents stated the Deaf community was only somewhat organized in their area. This suggests that the current state of the Deaf community may not be sufficiently organized to facilitate the delivery of emergency preparedness

material and training. The chi-square test again showed that these trends did not vary by the location group ($\chi^2 = 2.25$, $p = 0.325$), or the identity group ($\chi^2 = 3.24$, $p = 0.198$).

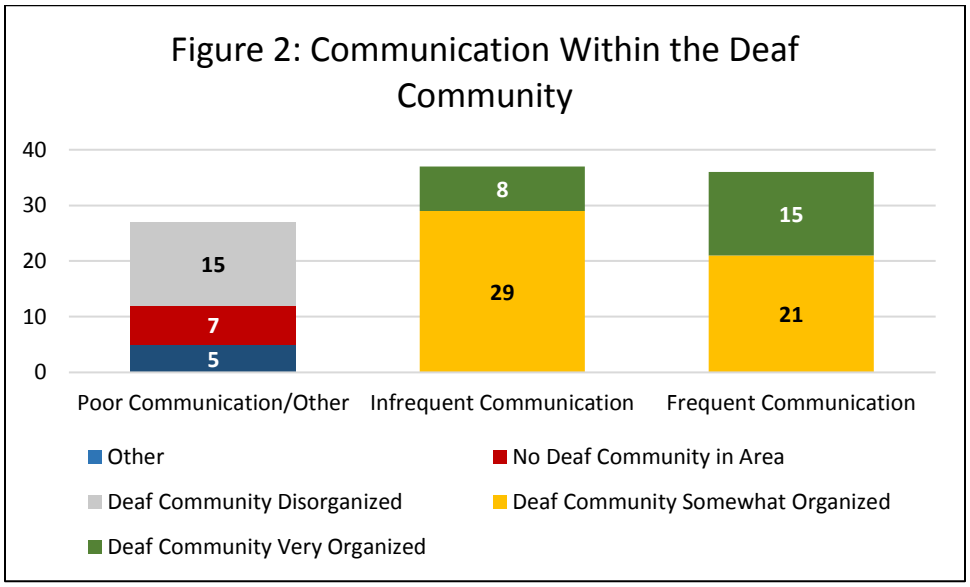

Table 4 shows the type of emergency message that the respondents indicated was most effective for them. The majority of respondents, 70%, indicated that some type of detailed message was best while 30% of the respondents wanted some form of a short message. The chi-square test indicated there was not significant difference by location ($\chi^2 = 1.67$, $p = 0.796$) but the chi-square test suggests there may be a significant difference by identity ($\chi^2 = 10.58$, $p = 0.032$). Cell size is again a problem with the chi-square tests for this question and prohibits further post-hoc analysis. However, in looking at the data in table 4, it appears that only Deaf/HH individuals want a detailed message that provide all of the information at once and that Deaf/HH individuals prefer short messages more than hearing individuals. The data suggests short, but detailed emergency messages would be best preferred by Deaf/HH individuals.

Table 4

During an emergency, which of the following is the most effective type of message for you?			
	Deaf/HH	Hearing	Total
A message that describes what is happening followed by what I need to do.	15	12	27
A message that first tells me what I need to do followed by a description of what is happening or will happen.	22	11	33
A message that has detailed information about everything all at once.	10	0	10
A short, simple message that tells me what I need to do and nothing more.	11	1	12
A short, simple message that tells what I need to do and includes how I can get more information.	14	4	18

The responses for the questions in Table 5 indicate that local governments are the most common source of information during an emergency. Because the question was not ranked, it is inappropriate to interpret this data as indications of preference, however only 11 of the respondents who selected State Government did not also select Local government which means a 48% overlap between these two choices and underscores the importance of government agencies to present the same, consistent message. Another interesting finding from this question is that only 11 of the 35 respondents who indicated they received information from community organizations for the Deaf did not select another source of information. More troubling is the indication that most individuals relied on only one source of information. Of the 96 respondents that answered this question, 48 (50%) indicated they only used one source of information during an emergency.

Table 5

What sources have you used to find information about how to prepare for an emergency?	
Local government	51
State government	41
Community organizations for the Deaf.	35
Other (please specify)	21
Volunteer organizations	17
Faith-based organizations	12

Table 6 shows the responses for the other multiple selection question. The most common type of message respondents found useful was receiving text alerts on mobile devices and the least common type of message was radio announcements translated into text. These answers support the research showing that Deaf/HH individuals are earlier adopters of new technology. Most respondents selected at least two choices. The majority of the respondents that selected only one choice, 12 out of 19, selected receiving text alerts on mobile devices. This suggests that emergency information delivered via SMS text on a mobile device is the preferred mode of communication; however, because respondents were not asked to rank their answers, this interpretation should be made cautiously.

Table 6

Which of the following are most useful for you to get information during an emergency?	
Emergency text message alerts via mobile device.	86
Televised emergency press conferences with an American Sign Language interpreter only.	56
Televised emergency press conferences with Closed Captioning only.	50
Social media posts, such as videos featuring content in American Sign Language.	46
All text social media posts.	41
Emergency alerts sent to me via email.	35
Communications from leaders and organizers in the Deaf community.	24
A telephone hotline with video relay service.	15
Televised emergency press conferences with no ASL Interpreter and with no closed captioning.	14
Other (please specify)	12
Radio announcements translated into readable text.	10

Table 7 shows the themes that emerged from the content analysis of the two free response questions. Despite the fact that text messaging was the most common answer in Table 6, television, specifically with closed captioning, was the most frequently mentioned method for receiving information during an emergency when an ASL interpreter is not available. Written communication was the least mentioned method of communication. This difference in response patterns suggest the phrase

"during an emergency" may not be specific enough to draw a meaningful interpretation from this data because it is unclear from the responses if the respondents were envisioning an emergency situation where they were outside of the home. One example could include being in an evacuation shelter during a hurricane, or a situation with an impending disaster where there was still time to make individual preparations.

Table 7

How do you get information when an American Sign Language interpreter is not available during an emergency?		What recommendations do you have for public safety agencies when communicating with the Deaf community?	
Television or Closed Captioning	31	Use Interpreters	46
Closed Captioning	*18*	*ASL*	*16*
People	21	*Qualified/ CDI*	*10*
Family	*12*	Smartphone/Text/Email	20
Text or email	15	Television Closed Captioning/ Written	14
Internet	13	Outreach	13
social media	13	Cultural Awareness	4
Facebook	*4*		
Written/ Pen and Paper	6		

The importance of having sign language interpreters was very clear in the responses for recommendations. These responses also indicated a concern on the quality of the interpreter with 16 respondents specifically mentioning ASL and 10 respondents mentioning Certified Deaf Interpreters (CDI). Example responses were:

- *"Have ASL certified and QUALIFIED ASL interpreters and CDI to be ready to provide."*
- *"Only interpreters with national certification should be used. Anything less and you are risking people's lives and spreading inaccurate information."*
- *"Not everyone who calls themselves an "interpreter" is one. And many certified interpreters are NOT QUALIFIED to be interpreting press conference. …"*
- *"Use a CDI during live announcements and keep the interpreter on screen at all times."*

This last example also illustrates the concern of some respondents on making sure that sign language interpreters were positioned appropriately during a televised broadcast. For example, one respondent wrote: *"… Hate it when the interpreter is on TV but either the camera doesn't show the interpreter or they run other printed announcements across the screen and you can't read the interpreter!"*

Two other interesting topics emerged from this question, the need for emergency officials to conduct community outreach and the need for emergency officials to develop cultural awareness of the Deaf/HH community. Specific examples of this first topic included:

- *"Meet with the Deaf leaders in the community and set up a town hall meeting for the Deaf community."*
- *"… Work close with other organization that serve the Deaf."*
- *"… Meet with the Deaf Community and start building working relationships with them. If you are scared or don't know how to start, interpreters are your friend and can help you make those connections and build bridges."*

These comments suggest that some within the Deaf community view emergency awareness more as the responsibility of official organizations than the individual.

There were only a few responses that were categorized as developing cultural awareness. This is an important topic to mention because it contained negative feedback about the survey itself. One respondent wrote: *"For starters, this survey was not very well planned... it's only in English with the Deaf community as the target audience who's[sic] primary language is usually ASL. You're missing a huge segment by not being inclusive of ASL - which is exactly the problem with FEMA, and other safety agencies. Simple things are not thought of."* Other responses were more positive, *"Patience Open minded"*, but the negative comments are important to consider because they indicate the tension

between the Deaf community and hearing community and highlight how the failure to address Deaf culture may result in the resistance of some Deaf/HH to the messages of emergency preparedness.

Discussion

This initial study involving stakeholders in the Deaf Community has provided public safety agencies and future researchers several opportunities to encourage engagement in the emergency communications planning process. Based on available data, emergency communications personnel should first examine the needs of the Deaf Community within their agency's jurisdiction. Incorporating the unique needs of the Deaf/HH into emergency preparedness material and first responder training is important to help the existing members of this population prepare for disasters and improve their outcomes in future disasters.

The main limitation of this study is selection bias resulting from the survey being conducted in English without an option for signed interpretation. Further research that incorporates a larger survey population and involving the ability to communicate survey questions in ASL and other formats is recommended.

While the use of social media is not new to the Deaf/HH, the data gathered in the study suggests the use of platforms such as Facebook and Twitter for emergency information is growing in the Deaf/HH Community. Several instances of this growing trend have been identified, particularly in situations where accommodations for the Deaf/HH were either not made or were not clear. One such example includes a press conference conducted by the South Carolina Emergency Management Division on May 29, 2017, during which representatives announced the launch of a new SCEMD website and new emergency mobile device application. The event was video streamed via Facebook Live, but there was no closed captioning or ASL interpreter. Social media users immediately commented negatively on SCEMD's social media pages, many inquiring why there was no ASL interpreter.

The Division did include text commentary using quotes from the press conference as part of the live feed; however, since SCEMD had set a precedent for providing a Certified Deaf Interpreter in previous emergency press conferences, the audience expectation was not met and gave the impression of a lack of inclusiveness. Other users engaged in their own posts, further distracting from the purpose of the press conference, which was to announce new tools designed to improve accessibility to emergency information.

Source: SCEMD Facebook page, May 29, 2018. www.facebook.com/SCEMD

The research suggests that this particular incident, like many in recent large-scale disasters, could have been avoided by further involving and engaging the Deaf Community in steady-state and/or blue-sky planning efforts. One possible option for inclusive social media messaging on platforms such as Facebook involves posting content as normal then following up with an ASL-translated video in the comments of the original post. This same method can be adapted to other language formats such as Spanish.

Access and functional needs coordinators, when available, can be a resource for emergency communications personnel seeking to engage the Deaf Community. By including the Deaf/HH in steady-state public information planning efforts, agencies can develop a professional relationship in which resources, strengths, weaknesses and methods can be discussed in a manner that are tailored by the direct input from the leaders of the community and the agency's audience. By virtue of the relationships

established in this planning process, the agency public information staff is then tapping into an already existing communications network within the Deaf Community, a network of individuals, leaders and stakeholders that is already a trusted method of sharing information. While this study indicated Deaf Communities had varying degrees of organization and frequency of communications, an agency can empower these established communication networks within their local Deaf Communities by sharing preparedness information for residents and sending emergency, life-safety information through these community leaders during a crisis. In so doing, Deaf/HH community leaders become the agency's message advocates, strengthening the overarching crisis message and fostering resonance with the residents that both groups serve.

This study also indicates the need for further research into the compatibility of emergency message scripting recommendations and the culture of the Deaf Community. A potential goal could be to develop a universally designed message type than can be understood by all audiences through different translations and formats. Most respondents stated a preference to a type of emergency message that begins with public protective actions followed by information about the incident. These results seem to indicate a validation of the classic 'inverted pyramid' style of writing media articles, leading with the most important information, in this case being public action, followed by supporting facts in descending importance. An example of this type of emergency messaging could be:

"RESIDENTS MUST IMMEDIATELY EVACUATE DOWNTOWN CENTRAL CITY DUE TO A DANGEROUS CHEMICAL LEAK. A SHELTER IS OPEN AT CENTRAL CITY HIGH SCHOOL…"

Further, to avoid confusion and reduce the amount of time it takes for individuals to process the emergency message and to act on the information, emergency alerting authorities should make every effort to eliminate jargon and acronyms in public messaging. For example, a phrase like "Shelter in place" might be suitable for populations in closed ecosystems such as office buildings that have had prior emergency training. However, such a phrase can be confusing when translated into ASL, since

possible translations could be “stay where you are” (even if it’s unsafe) or “the place where you are is an emergency shelter” (for yourself and others.) It is incumbent on public safety agencies to use the simplest language possible, such as “Get inside, stay inside” to reach the widest audience possible with minimal loss of comprehension.

The Emergency Alert System and its predecessors have relied on broadcast radio and television as a primary and secondary means of alerting residents during an emergency. These broadcast methods are designed to reach as many people as possible in the shortest amount of time available. These legacy systems are inherently phonocentric by relying audio messaging and thus create the expectation of emergency alerting authorities that audio messages are the primary means of notifying everyone who may be in danger. As noted in this research, audio emergency messages and/or televised emergency media briefings with no ASL interpreter often require Deaf/HH individuals to get information from another source, increasing the likelihood of misinformation, or to not be informed about the emergency at all, putting their lives at risk. The modern Integrated Public Alert and Warning System does include Wireless Emergency Alerts via text message, but such messages are limited by 90 characters. More work must be done to expand this capability since many populations are increasingly reliant on visual and text-based media via mobile devices.

Anecdotal evidence presented to this author by colleagues throughout the course of this research allude to the mindset of “the needs of the many outweigh the needs of the few” regarding emergency public information. Public safety agencies are often faced with severe budgetary constraints and limited resources that force decision makers into this type of mindset. However, such resource limitations on emergency alert and warning capabilities can be mitigated by adopting a culture of preparedness that involves the culture of the Deaf Community in emergency public alert planning. If public safety agencies can understand the needs of the few in a given community prior to a disaster,

emergency messaging could be improved so that they have resonance with the many people that depend on trusted, official emergency information.

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Appendix A

Survey Invitation Letter

Hello everyone,

The Emergency Management Institute's Master Public Information Officer Program is currently conducting research into the effectiveness of emergency messages during disasters. As part of this research, we would very much like to include feedback, thoughts and insights from the Deaf Community. We've created a very short survey that examines how people receive information in their areas and provides a forum for commentary and suggestions. The results of this survey will be compiled into a research paper and submitted for review through the Emergency Management Institute PIO Program. It is our hope that this work will result in helping public safety agencies better serve the Deaf Community through better emergency messaging when it's needed the most.

Here is the link to the survey, we ask that you please share this survey with members within your organizations and with your community contacts:
https://www.surveymonkey.com/r/DeafCommunityEmergencyMessages

Feel free to contact me at any time to discuss. We cannot thank you enough for taking part in this important effort!

Derrec Becker, SC CEM

Chief of Public Information & External Affairs

South Carolina Emergency Management Division

Mobile: 803.530.2193 | Office: 803.737.8500

Online: scemd.org | Social: @SCEMD

Skype: SCEmergency

"South Carolina's emergency management program minimizes loss of life and property damage from all-hazard incidents."

Appendix B

Survey Questions

1. Thank you for agreeing to participate in this survey conducted by the Emergency Management Institute's Master of Public Information Program. By completing this survey, you will be helping public safety agencies refine emergency messages during large-scale disasters. Your personal information will not be collected as part of this effort, with the exception of what state you live in. Selecting "I Agree" will indicate that you understand your answers will be shared with government stakeholders in the emergency management field.

☐ Agree

2. In what state or U.S. territory do you live?

3. Which of the following best describes you?

- ○ Deaf
- ○ Partially Deaf
- ○ Hard of hearing
- ○ Hearing with connections to the Deaf community

4. Which of the following best describes the Deaf community in your area?

- ○ The Deaf community in my area is very organized and we communicate frequently.
- ○ The Deaf community in my area is very organized but we do not communicate frequently.
- ○ The Deaf community in my area is somewhat organized and we communicate frequently.
- ○ The Deaf community in my area is somewhat organized and we do not communicate frequently.
- ○ The Deaf community in my area is disorganized and we do not communicate.
- ○ There is no Deaf community in my area.
- ○ Other (please specify)

5. Which of the following best describes how you are personally prepared for emergencies such as a house fire, a tornado, a hurricane and/or an earthquake?

- ○ I have a personal emergency plan and know exactly what I should do during an emergency.
- ○ I have a personal emergency plan, but I will need help from others during an emergency.
- ○ My personal emergency plan will rely on government services if and when they are available.
- ○ I do not have a personal emergency plan and I would like help in creating one.
- ○ I do not need a personal emergency plan.

6. Which of the following best describes your local public safety agencies?

- Very involved with the Deaf community.
- Somewhat involved in the Deaf community.
- Not at all involved with the Deaf community.
- Other (please specify)

7. What sources have you used to find information about how to prepare for an emergency?

- Local government
- State government
- Community organizations for the Deaf.
- Faith-based organizations
- Volunteer organizations

8. How well do local public safety agencies communicate during an emergency?

- Extremely well
- Very well
- Somewhat well
- Not so well
- Not at all well

9. Which of the following are most useful for you to get information during an emergency? Check all that apply:

- Emergency text message alerts via mobile device.
- Televised emergency press conferences with Closed Captioning only.
- Televised emergency press conferences with an American Sign Language interpreter only.
- Emergency alerts sent to me via email.
- All text social media posts.
- Social media posts, such a videos featuring content in American Sign Language.
- Communications from leaders and organizers in the Deaf community.
- Televised emergency press conferences with no ASL Interpreter and with no closed captioning.
- Radio announcements translated into readable text.
- A telephone hotline with video relay service.

☐ Other (please specify)

10. During an emergency, which of the following is the most effective type of message for you?

○ A short, simple message that tells me what I need to do and nothing more.

○ A short, simple message that tells what I need to do and includes how I can get more information.

○ A message that first tells me what I need to do followed by a description of what is happening or will happen.

○ A message that describes what is happening followed by what I need to do.

○ A message that has detailed information about everything all at once.

11. How do you get information when an American Sign Language interpreter is not available during an emergency?

12. What recommendations do you have for public safety agencies when communicating with the Deaf community?